Figure 1

Sequence ID 1: human interferon alpha 1 (GenBank 13128950)
MASPFALLMVLVVLSCKSSCSLGCDLPETHSLDNRRTLMLLAQMSRISPSSCLMDRHDFGF
PQEEFDGNQFQKAPAISVLHELIQQIFNLFTTKDSSAAWDEDLLDKFCTELYQQLNDLEACV
MQEERVGETPLMNADSILAVKKYFRRITLYLTEKKYSPCAWEVVRAEIMRSLSLSTNLQERL
RRKE

Sequence ID 2: human interferon alpha-2a (GenBank 2781226)
CDLPQTHSLGSRRTLMLLAQMRKISLFSCLKDRHDFGFPQEEFGNQFQKAETIPVLHEMIQ
QIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAVRKYF
QRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQESLRSKE

Sequence ID 3: human interferon alpha-2b (GenBank 30171279)
MCDLPQTHSLGSRRTLMLLAQMRRISLFSCLKDRHDFGFPQEEFGNQFQKAETIPVLHEMI
QQIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAVRKY
FQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQESLRSKE

Sequence ID 4: human interferon alpha 4 (GenBank 10835103)
MALSFSLLMAVLVLSYKSICSLGCDLPQTHSLGNRRALILLAQMGRISHFSCLKDRHDFGFP
EEEFDGHQFQKAQAISVLHEMIQQTFNLFSTEDSSAAWEQSLLEKFSTELYQQLNDLEACVI
QEVGVEETPLMNEDSILAVRKYFQRITLYLTEKKYSPCAWEVVRAEIMRSLSFSTNLQKRLR
RKD

Sequence ID 5: human interferon alpha 5 (GenBank 4504597)
MALPFVLLMALVVLNCKSICSLGCDLPQTHSLSNRRTLMIMAQMGRISPFSCLKDRHDFGFP
QEEFDGNQFQKAQAISVLHEMIQQTFNLFSTKDSSATWDETLLDKFYTELYQQLNDLEACM
MQEVGVEDTPLMNVDSILTVRKYFQRITLYLTEKKYSPCAWEVVRAEIMRSFSLSANLQERL
RRKE

Sequence ID 6: human interferon alpha 6 (GenBank 11128015)
MALPFALLMALVVLSCKSSCSLDCDLPQTHSLGHRRTMMLLAQMRRISLFSCLKDRHDFRF
PQEEFDGNQFQKAEAISVLHEVIQQTFNLFSTKDSSVAWDERLLDKLYTELYQQLNDLEAC
VMQEVWVGGTPLMNEDSILAVRKYFQRITLYLTEKKYSPCAWEVVRAEIMRSFSSSRNLQE
RLRRKE

Sequence ID 7: human interferon alpha 7 (GenBank 10800142)
MARSFSLLMAVLVLSYKSICSLGCDLPQTHSLRNRRALILLAQMGRISPFSCLKDRHEFRFP
EEEFDGHQFQKTQAISVLHEMIQQTFNLFSTEDSSAAWEQSLLEKFSTELYQQLNDLEACVI
QEVGVEETPLMNEDFILAVRKYFQRITLYLTEKKYSPCAWEVVRAEIMRSFSFSTNLKKGLR
RKD

Sequence ID 8: human interferon alpha 8 (GenBank 4504599)
MALTFYLMVALVVLSYKSFSSLGCDLPQTHSLGNRRALILLAQMRRISPFSCLKDRHDFEFP
QEEFDDKQFQKAQAISVLHEMIQQTFNLFSTKDSSAALDETLLDEFYIELDQQLNDLEVLCD
QEVGVIESPLMYEDSILAVRKYFQRITLYLTEKKYSSCAWEVVRAEIMRSFSLSINLQKRLKS
KE

Sequence ID 9: human interferon alpha 10 (GenBank 4504589)
MALSFSLLMAVLVLSYKSICSLGCDLPQTHSLGNRRALILLGQMGRISPFSCLKDRHDFRIPQ
EEFDGNQFQKAQAISVLHEMIQQTFNLFSTEDSSAAWEQSLLEKFSTELYQQLNDLEACVIQ
EVGVEETPLMNEDSILAVRKYFQRITLYLIERKYSPCAWEVVRAEIMRSLSFSTNLQKRLRRK
D

Sequence ID 10: human interferon alpha 13 (GenBank 13128966)
MASPFALLMALVVLSCKSSCSLGCDLPETHSLDNRRTLMLLAQMSRISPSSCLMDRHDFGF
PQEEFDGNQFQKAPAISVLHELIQQIFNLFTTKDSSAAWDEDLLDKFCTELYQQLNDLEACV
MQEERVGETPLMNADSILAVKKYFRRITLYLTEKKYSPCAWEVVRAEIMRSLSLSTNLQERL
RRKE

Sequence ID 11: human interferon alpha 14 (GenBank 4504591)
MALPFALMMALVVLSCKSSCSLGCNLSQTHSLNNRRTLMLMAQMRRISPFSCLKDRHDFE
FPQEEFDGNQFQKAQAISVLHEMMQQTFNLFSTKNSSAAWDETLLEKFYIELFQQMNDLEA
CVIQEVGVEETPLMNEDSILAVKKYFQRITLYLMEKKYSPCAWEVVRAEIMRSFSFSTNLQK
RLRRKD

Sequence ID 12: human interferon alpha 16 (GenBank 4504593)
MALSFSLLMAVLVLSYKSICSLGCDLPQTHSLGNRRALILLAQMGRISHFSCLKDRYDFGFP
QEVFDGNQFQKAQAISAFHEMIQQTFNLFSTKDSSAAWDETLLDKFYIELFQQLNDLEACVT
QEVGVEEIALMNEDSILAVRKYFQRITLYLMGKKYSPCAWEVVRAEIMRSFSFSTNLQKGLR
RKD

Sequence ID 13: human interferon alpha 17 (GenBank 10880985)
MALSFSLLMAVLVLSYKSICSLGCDLPQTHSLGNRRALILLAQMGRISPFSCLKDRHDFGLP
QEEFDGNQFQKTQAISVLHEMIQQTFNLFSTEDSSAAWEQSLLEKFSTELYQQLNNLEACVI
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RKD

Sequence ID 14: human interferon alpha 21 (4504595)
MALSFSLLMAVLVLSYKSICSLGCDLPQTHSLGNRRALILLAQMGRISPFSCLKDRHDFGFP
QEEFDGNQFQKAQAISVLHEMIQQTFNLFSTKDSSATWEQSLLEKFSTELNQQLNDMEACV
IQEVGVEETPLMNVDSILAVKKYFQRITLYLTEKKYSPCAWEVVRAEIMRSFSLSKIFQERLR
RKE

Sequence ID 15: human interferon beta (GenBank 124469), signal peptide deleted
MSYNLLGFLQRSSNFQCQKLLWQLNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYE
MLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLEEKLEKEDFTRGKLMSSLHLKR
YYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINRLTGYLRN

Sequence ID 16: human interferon kappa (GenBank 14488028)
MSTKPDMIQKCLWLEILMGIFIAGTLSLDCNLLNVHLRRVTWQNLRHLSSMSNSFPVECLRE
NIAFELPQEFLQYTQPMKRDIKKAFYEMSLQAFNIFSQHTFKYWKERHLKQIQIGLDQQAEY

LNQCLEEDENENEDMKEMKENEMKPSEARVPQLSSLELRRYFHRIDNFLKEKKYSDCAWEI
VRVEIRRCLYYFYKFTALFRRK

Sequence ID 17: human interferon tau (GenBank 28882045)
MIIKHFFGTVLVLLASTTIFSLDLKLIIFQQRQVNQESLKLLNKLQTLSIQQCLPHRKNFLLPQK
SLSPQQYQKGHTLAILHEMLQQIFSLFRANISLDGWEENHTEKFLIQLHQQLEYLEALMGLE
AEKLSGTLGSDNLRLQVKMYFRRIHDYLENQDYSTCAWAIVQVEISRCLFFVFSLTEKLSKQ
GRPLNDMKQELTTEFRSPR

Sequence ID 18: human interferon omega (GenBank 4504605)
MALLFPLLAALVMTSYSPVGSLGCDLPQNHGLLSRNTLVLLHQMRRISPFLCLKDRRDFRFP
QEMVKGSQLQKAHVMSVLHEMLQQIFSLFHTERSSAAWNMTLLDQLHTGLHQQLQHLETC
LLQVVGEGESAGAISSPALTLRRYFQGIRVYLKEKKYSDCAWEVVRMEIMKSLFLSTNMQE
RLRSKDRDLGSS

Sequence ID 19: interferon beta variant #2 L5Q in C17S background
MSYNQLGFLQRSSNFQSQKLLWQLNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYE
MLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLEEKLEKEDFTRGKLMSSLHLKR
YYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINRLTGYLRN

Sequence ID 20: interferon beta variant #7 L5Q/F8E in C17S background
MSYNQLGELQRSSNFQSQKLLWQLNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYE
MLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLEEKLEKEDFTRGKLMSSLHLKR
YYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINRLTGYLRN

Sequence ID 21: interferon beta variant #15 L5Q/F8E/F111N in C17S background
MSYNQLGELQRSSNFQSQKLLWQLNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYE
MLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLEEKLEKEDNTRGKLMSSLHLK
RYYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINRLTGYLRN

Sequence ID 22: interferon beta variant #23 L5Q/F8E/L116E in C17S background
MSYNQLGELQRSSNFQSQKLLWQLNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYE
MLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLEEKLEKEDFTRGKEMSSLHLK
RYYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINRLTGYLRN

Sequence ID 23: interferon beta variant #36 F8E/F111N/L116E in C17S background
MSYNLLGELQRSSNFQSQKLLWQLNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYE
MLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLEEKLEKEDNTRGKEMSSLHLK
RYYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINRLTGYLRN

Sequence ID 24: interferon beta variant #39 L5Q/F8E/F111N/L116E in C17S background
MSYNQLGELQRSSNFQSQKLLWQLNGRLEYCLKDRMNFDIPEEIKQLQQFQKEDAALTIYE
MLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLEEKLEKEDNTRGKEMSSLHLK
RYYGRILHYLKAKEYSHCAWTIVRVEILRNFYFINRLTGYLRN

Sequence ID 25: interferon beta variant #64 L5Q/F8E/L47K/F111N/L116E/L120R in C17S background
MSYNQLGELQRSSNFQSQKLLWQLNGRLEYCLKDRMNFDIPEEIKQKQQFQKEDAALTIYE
MLQNIFAIFRQDSSSTGWNETIVENLLANVYHQINHLKTVLEEKLEKEDNTRGKEMSSRHLK
RYYGRILHYLKAKEYSHCAWTIVRVEI LRNFYFINRLTGYLRN

Sequence ID 26: interferon kappa variant #4_G7 V8N/W15R/Y48Q/M52N/F76S/Y78A/I89T
LDCNLLNNHLRRVTRQNLRHLSSMSNSFPVECLRENIAFELPQEFLQQTQPNKRDIKKAFYE
MSLQAFNIFSQHTSKAWKERHLKQIQTGLDQQAEYLNQCLEEDENENEDMKEMKENEMKP
SEARVPQLSSLELRRYFHRIDNFLKEKKYSDCAWEIVRVEIRRCLYYFYKFTALFRRK

Sequence ID 27: interferon kappa variant #46_E2 W15R/I37N/Y48Q/M52N/F76S/Y78A/I89T/ Y97D/V161A/C166A/Y168S/Y171T
LDCNLLNVHLRRVTRQNLRHLSSMSNSFPVECLRENNAFELPQEFLQQTQPNKRDIKKAFY
EMSLQAFNIFSQHTSKAWKERHLKQIQTGLDQQAEDLNQCLEEDENENEDMKEMKENEMK
PSEARVPQLSSLELRRYFHRIDNFLKEKKYSDCAWEIVRAEIRRALSYFTKFTALFRRK

Sequence ID 28: interferon kappa variant #47_C4 W15R/F76S/Y78A
LDCNLLNVHLRRVTRQNLRHLSSMSNSFPVECLRENIAFELPQEFLQYTQPMKRDIKKAFYE
MSLQAFNIFSQHTSKAWKERHLKQIQIGLDQQAEYLNQCLEEDENENEDMKEMKENEMKP
SEARVPQLSSLELRRYFHRIDNFLKEKKYSDCAWEIVRVEIRRCLYYFYKFTALFRRK

Sequence ID 29: interferon kappa variant #23_C10 I37N/Y48Q/M52N/F76S/Y78A/Y97D
LDCNLLNVHLRRVTWQNLRHLSSMSNSFPVECLRENNAFELPQEFLQQTQPNKRDIKKAFY
EMSLQAFNIFSQHTSKAWKERHLKQIQIGLDQQAEDLNQCLEEDENENEDMKEMKENEMK
PSEARVPQLSSLELRRYFHRIDNFLKEKKYSDCAWEIVRVEIRRCLYYFYKFTALFRRK

Sequence ID 30: interferon kappa variant #40_A10 W15R/I37N/F76S/Y78A
LDCNLLNVHLRRVTRQNLRHLSSMSNSFPVECLRENNAFELPQEFLQYTQPMKRDIKKAFY
EMSLQAFNIFSQHTSKAWKERHLKQIQIGLDQQAEYLNQCLEEDENENEDMKEMKENEMK
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Figure 2

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2b: 2   CDLPQTHSLGSRRTLMLLAQMRRISLFSCLKDRHDFGFPQEEF-GNQFQKAETIPVLHEM 60
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16: 24  CDLPQTHSLGNRRALILLAQMGRISHFSCLKDRYDFGFPQEVFDGNQFQKAQAISAFHEM 83
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2b: 61  IQQIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLEACVIQGVGVTETPLMKEDSILAV 120
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2b: 121 RKYFQRITLYLKEKKYSPCAWEVVRAEIMRSFSLSTNLQESLRSKE 166
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Figure 3

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IFNK: ldcnllnvhlrrvtwqnlrhlssmsnsfpveclreniafelpqeflqytq
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1B5L:   CYLSRKLMLDAR-ENLKLLDRMNRLSPHSCLQDRKDFGLPQEMVEGDQ
1ITF:   CDLPQTHSLGSR-RTLMLLAQMRKISLFSCLKDRHDFGFPQE-EFGNQ

IFNK: pmkrdikkafyemslqafnifsqht--fkywkerhkqiqigldqqaeyln
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1B5L: LQKDQAFPVLYEMLQQSFNLFYTEHSSAAWDTTLLEQLCTGLQQQLDHLD
1ITF: FQKAETIPVLHEMIQQIFNLFSTKDSSAAWDETLLDKFYTELYQQLNDLE

IFNK: qcleedenenedmkemkenemkpsearvpqlsslelrryfhridnflkek
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1B5L: TC----------------------RG|MDPIVTVKKYFQGIYDYLQEK
1ITF: AC------------VIQGVGVTETPLMKEDSILAVRKYFQRITLYLKEK

IFNK: kysdcaweivrveirrclyyfykftalfrrk
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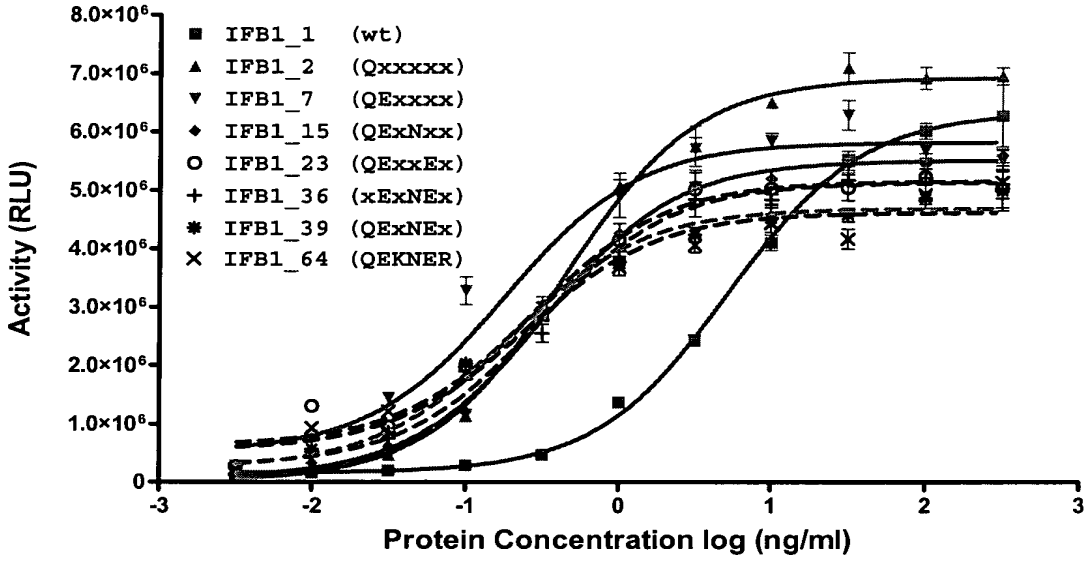
Figure 4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6.0×10⁶
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1.0×10⁶
0
Activity (RLU)
IFB1_1 (wt)
IFB1_2 (Qxxxxx)
IFB1_7 (QExxxx)
IFB1_15 (QExNxx)
IFB1_23 (QExxEx)
IFB1_36 (xExNEx)
IFB1_39 (QExNEx)
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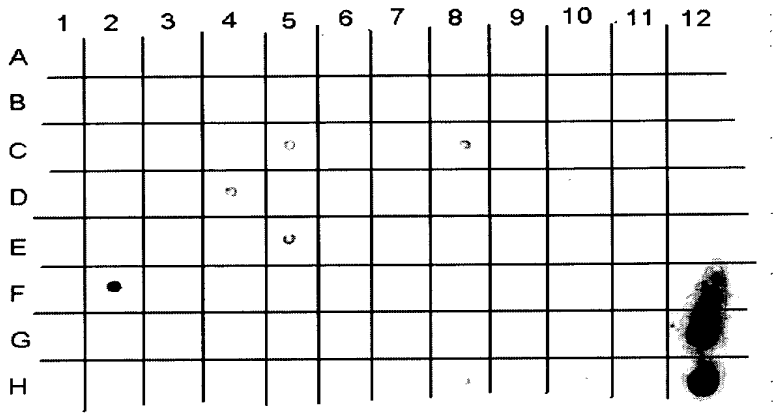
1
2
3
Protein Concentration log (ng/ml)

Figure 5



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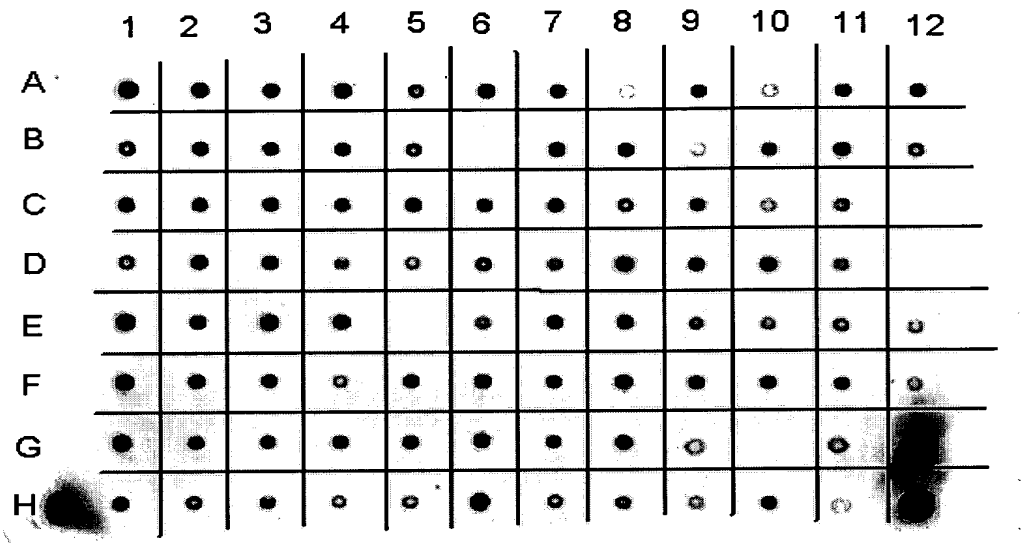

Figure 7

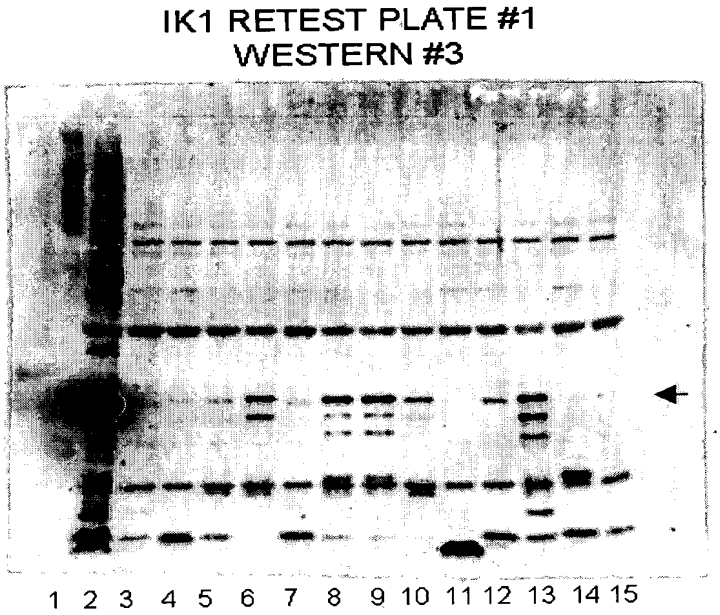
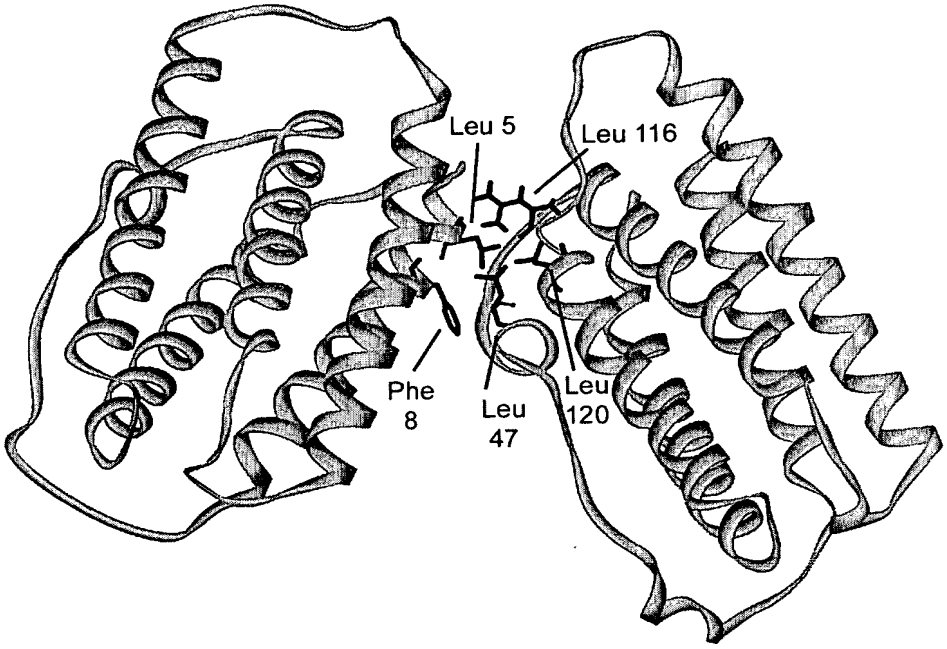
Figure 8